Call for Papers/Participation

NIPS*2001 WORKSHOP

Artificial Neural Networks in Safety-Related Areas: Applications and Methods for Validation and Certification

Whistler, Canada, December 8th, 2001

`http://ase.arc.nasa.gov/people/schumann/workshops/NIPS2001`

Over the recent years, Artificial Neural Networks have found their way into various safety-related and safety-critical areas, for example, power generation and transmission, transportation, avionics, environmental monitoring and control, medical applications, and consumer products. Applications range from classification to monitoring and control. Quite often, these applications proved to be highly successful, leading from pure research prototypes into serious experimental systems (e.g., a neural-network-based flight-control system test-flown on a NASA F-15ACTIVE) or commercial products (e.g., Sharp's Logi-cook).

However, the general question of how to make sure that the ANN-based system performs as expected in all cases has not yet been addressed satisfactorily. All safety-related software applications require careful verification and validation (V&V) of the software components, ranging from extended testing to full-fledged certification procedures. However, for neural-network based systems, a number of specific issues have to be addressed. For example, a lack of a concise plant model, often a major reason to use a ANN in the first place, makes traditional approaches to V&V impossible.

In this workshop, we will address such issues. In particular, we will discuss the following (non-exhaustive list of) topics:

- theoretical methodologies to characterise the properties of ANN solutions, e.g., multiple realisations of a particular network and ways of managing this
- fundamental software approaches to V&V and implications for ANNs, e.g., the application of FMEA
- statistical (Bayesian) methods and symbolic techniques like rule extraction with subsequent V&V to assess and guarantee the performance of a ANN
- dynamic monitoring of the ANN's behavior
- stability proofs for control of dynamical systems with ANNs
- principled approaches to design assurance, risk assessment, and performance evaluation of systems with ANNs
- experience of application and certification of ANNs for safety-related applications
- V&V techniques suitable for on-line trained and adaptive systems

This workshop aims to bring together researchers who have applied ANNs in safety-related areas and actually addressed questions of demonstrating flawless operation of the ANN, researchers working on theoretical topics of convergence and performance assessment, researchers in the area of nonlinear adaptive control, and researchers from the area of formal methods in software design for safety-critical systems.

Many prototypical/experimental application of neural networks in safety-related areas have demonstrated their usefulness successfully. But ANN applicability in safety-critical areas is substantially limited because of a lack of methods and techniques for verification and validation. Currently, there is no silver bullet for V&V in traditional software, and with the more complicated situation for ANNs, none is expected here in the short run. However, any result can have substantial impact in this field.

Contributions:

If you are planning to attend this workshop as a particpiant and/or are interested to present your work, please notify one of the workshop organizers no later than

October 22, 2001.

This email should contain name and tentative title of the presentation (if you are interested to give a presentation). A short (1-4 pages) abstract, technical paper, or position paper is due on

October 29, 2001.

Please send this abstract/paper as Postscript or PDF to `schumann@email.arc.nasa.gov`. Notification of acceptance will be sent out on Nov 5, 2001. All accepted contributions will be handed out to the participants as an informal workshop proceedings and will appear as a RIACS Technical Report.

Workshop Organizers:

J. Schumann, RIACS/NASA Ames, `schumann@email.arc.nasa.gov`
P. Lisboa, Liverpool John Moores University, `P.J.Lisboa@livjm.ac.uk`
R. Knaus, Instant Recall, Inc., `rknaus@irecall.com`